1. A method for forming a magnetic tunneling junction (MTJ) memory cell having a flux-concentrating keeper structure on an upper conductor comprising:

providing a substrate;

forming on the substrate a planarized linear lower conductor layer having a width W_1;

forming on said lower conductor layer a patterned, MTJ stack, said stack being centrally aligned and co-linear with said lower conductor layer and said stack having width W_2 which is less than width W_1;

forming an insulating layer contiguous with and laterally disposed to each side of said MTJ stack, an upper surface of said insulating and an upper surface of said MTJ stack forming a common plane;

forming an upper linear conductor on said plane, said conductor contacting said MTJ structure, said conductor being transverse to said MTJ structure, said conductor having a keeper structure and said conductor being formed by a method comprising;

forming a conducting layer on said plane;

forming a first soft magnetic layer on said conducting layer;

forming a capping layer on said soft magnetic layer;

patterning said layers to form a linear structure with a planar horizontal upper surface and planar parallel vertical surfaces, the width of said structure, W_3, being substantially equal to W_2, said structure being transverse to said MTJ stack and an upper surface of said MTJ stack being thereby exposed laterally on either side of said structure;

removing, using a first etching process aligned by said vertical surfaces, an upper portion of said MTJ stack laterally disposed to either side of said linear structure;

forming a second, continuous soft magnetic layer on exposed surfaces of said MTJ stack and on horizontal and vertical surfaces of said linear structure, said layer having an outer surface including vertical surface portions laterally disposed to either side of said linear structure and substantially parallel to said vertical sides;

removing, using a second, etching process aligned by said vertical outer surface portions of said second soft magnetic layer, all horizontal portions of said second soft magnetic layer, leaving, thereby, only vertical portions contacting vertical sides of said linear conductor and exposing, thereby, an upper horizontal surface of said linear structure and an upper surface of said MTJ structure.

2. The method of claim 1 wherein the formation of said MTJ stack further comprises:

forming a reference layer on said lower conductor layer;

forming a tunneling barrier layer on said reference layer;

forming a ferromagnetic sense layer on said tunneling barrier layer;

forming a first capping layer on said sense layer

patterning, using a photolithographic process, said layers to form an MTJ stack having parallel vertical planar sides, a horizontal upper surface and a width, W_2 defined by the distance between said vertical sides.

3. The method of claim 2 wherein said sense layer is a layer of CoFe, CoFe/NiFe, NiFe, CoFeB, NiFeB or Co formed to a thickness between approximately 30 and 200 angstroms.

4. The method of claim 2 wherein said tunneling barrier layer is a layer of Al_2O_3 or HfO formed to a thickness between approximately 5 and 30 angstroms.

5. The method of claim 2 wherein said reference layer is a layer of CoFe, CoFe/NiFe, NiFe, CoFeB, NiFeB or Co formed to a thickness between approximately 30 and 200 angstroms.

6. The method of claim 2 wherein said reference layer is a synthetic antiferromagnetic (SyAF) multi-layer formed by a method comprising:

forming a seed layer on said lower conductor layer;

forming an antiferromagnetic pinning layer on said seed layer;

forming a first ferromagnetic layer on said pinning layer;

forming an antiferromagnetically coupling layer on said first ferromagnetic layer;

forming a second ferromagnetic layer on said coupling layer.

7. The method of claim 6 wherein said first and second ferromagnetic layers are layers of CoFe or Co formed to thicknesses between approximately 10 and 40 angstroms.

8. The method of claim 6 wherein said coupling layer is a layer of Ru formed to a thickness between approximately 7 and 8 angstroms or a layer of Rh formed to a thickness between approximately 4.5 and 5.5 angstroms.

9. The method of claim 6 wherein said antiferromagnetic layer is a layer of MnPt or NiMn formed to a thickness between approximately 80 and 300 angstroms.

10. The method of claim 6 wherein said seed layer is a layer of NiFe, NiFeCr, or NiCr, formed to a thickness between approximately 20 and 50 angstroms.

11. The method of claim 2 wherein said first etching process is an ion-beam etch or a reactive ion etch (RIE) and wherein said removal of laterally disposed portions of said upper portion of the MTJ structure includes the complete removal of laterally disposed portions of said capping layer and a partial removal of laterally disposed portions of said sense layer formed beneath said capping layer, leaving laterally extending portions of said sense layer.

12. The method of claim 2 wherein said second etching process is a vertically directed ion-beam etch and the upper surface of the MTJ structure exposed by said vertically directed ion-beam etch comprises those portions of the tunneling barrier layer laterally disposed to said vertical sides of said second soft magnetic layer.

13. The method of claim 1 wherein said first soft magnetic layer includes an antiferromagnetic layer of IrMn formed to a thickness between approximately 30 and 100 angstroms, said antiferromagnetic layer contacting said conducting layer.

14. An MTJ memory device including an upper conductor with a keeper structure comprising:

a substrate;

an insulating layer formed on said substrate, a lower conductor layer being formed in said insulating layer and the upper surfaces of said insulating layer and said conductor being co-planar;

an MTJ stack formed, co-linearly and centrally, on said lower conductor, said stack including a sense layer;

an insulating layer formed, laterally disposed to both sides of said stack, the upper surfaces of said layer and the upper surface of said stack forming a common plane;

a horizontally layered upper conductor formed orthogonally to and contacting said MTJ stack on said plane, said upper conductor having planar vertical sides and the upper layer of said conductor being a layer of soft magnetic material;

a keeper structure formed on said upper conductor, said structure comprising said upper soft magnetic layer contacted on laterally opposite edges by an upper portion of vertical soft magnetic side pieces formed on said planar vertical sides, a lower portion of said vertical side pieces contacting sides of a sense layer and terminating on lateral extensions of said sense layer.